OPEN-CLOSE MECHANISM FOR SOFA BED

SPECIFICATION

CROSS REFERENCE TO RELATED APPLICATIONS

This application is the US national phase of PCT application PCT/IB2004/000568 filed 24 February 2004 with a claim to the priority of Italian patent application BA03A000019 itself filed 4 April 2003, the disclosures of which are herewith incorporated.

FIELD OF THE INVENTION

The present invention relates to a sofa bed and its open-close mechanism.

BACKGROUND OF THE INVENTION

As known, a sofa bed comprises an almost parallelepipedal frame structure that forms an internal containment area for bedding storage, and a number of interconnected movable frames. These frames move according to combined rotational/straight-line motions from the closed to the open position. In the closed position, the frames fold up to keep the mattress folded in a number of sections and stored in the area created by the fixed structure; in the open position, the movable frames are consecutively aligned, outside of this area and define a rest surface. These movements are made possible thanks to one or more mechanisms interposed between the fixed structure and the movable frames.

Up to now, various types of similar mechanisms with at least three movable frames have been developed and many state-of-the-art mechanisms easily convert the sofa into a bed without having to remove any of the cushions. The present applicant has already described and claimed a similar product in the Italian patent application BAO1A000005.

Despite the technical progress made, the known applications show still several disadvantages. The largest limitation of the known mechanisms is the risk of accidental closing. In fact, when in bed position, should the user be seated close to the hinged joint between the headboard frame and the adjacent central frame, an accidental closing of the bed may occur.

SUMMARY OF THE INVENTION

The invention solves the technical problem identified above in a sofa bed comprising an almost parallelepiped frame structure; a number of interconnected movable frames, together that move according to combined rotational/straight-line motions from the closed to the open position . According to the invention in the closed position the central and headboard frames are sequentially folded up, while in the open position, they are consecutively aligned; and a mechanism is provided that moves these frames . According to the invention the mechanism comprises at least one link, hinged to the joint between the headboard frame carrying the headboard, and the adjacent central frame preventing lowering of the above mentioned joint. In this

way, the problem of accidental closing of the bed has been solved.

According to a subsequent object, the invention is capable of moving the seat cushion by means of only two additional elements.

Furthermore this mechanism has one degree of freedom only and open and closes in one movement without having to remove the seat and back cushions.

BRIEF DESCRIPTION OF THE DRAWING

These and other advantages will be pointed out in the detailed description of the invention that will refer to the showing a nonrestrictive embodiment of the invention. Therein:

FIG. 1 shows the sofa-bed structure in the "bed" position;

FIG. 2 shows an axonometric view of the same sofa bed;

FIGS. 3, 4 and 5 show three consecutive steps of the sofa bed during the opening operation; and FIG. 6 shows a detail of the frame in the "bed" position.

SPECIFIC DESCRIPTION

With reference to the figures, the above-given objects are met thanks to a sofa bed comprising a driving mechanism positioned between each frame and the following one. This mechanism has synchronization tools to move the movable frames from the closed to the open position, and vice versa, in a single continuous movement.

The sofa bed (FIG. 2) is identified with the number/reference (11), while the fixed frame structure with (7). The frame structure (7) has an almost parallelepipedal shape that forms an internal containment area (14) and that is composed of several frames at least one of which acts as a support for back cushions 19.

The fixed structure (7) defines (FIG. 2) an internal containment area (14) inside which the interconnected movable frames fold up to convert the sofa bed to the sitting position. Then, these movable frames can switch from the closed to the open position (see the sequence in FIGS. 3, 4 and 5), provided that they are aligned, forming a rest surface (15).

The present mechanism (10) comprises synchronization tools interposed between the movable frames and serving to move the frames from the closed to the open position (see again the sequence in FIGS. 3, 4 and 5), and vice versa, in one movement. It comprises a linkage (16), a linkage (12) and a linkage (17). The lifting and opening system of this mechanism is provided by the linkages (16) and (12), and by springs (not shown in the figures) to facilitate the operation. In particular, a first elastic mean is interposed between the link (6) and the link (1), while between the link (1) and the fixed structure (7) is interposed a second retain elastic mean. this elastic means can also be positioned on those elements fastened to elements (6), (2) and (7). The linkage (12) provides the headboard (2) in the bed configuration, while, in the sitting configuration, this

headboard is vertical. The linkage (16) moves synchronously with the rest of the mechanism by means of links (8) and (9) hinged to the fixed structure (7). As an alternative to it, the lifting of this mechanism can also be obtained by means of two simple linkages (not shown in the figures), one end of each one is hinged to the fixed structure (7), and the other end is hinged to the frame (2). The two linkages are joined together by means of a link that synchronizes their motion. These linkages determine the vertical translation of the frame (2), upward during opening, downward during closing.

Finally, the linkage (17), shown in FIG. 6, comprising the links (4), (5), part of link (25) and part of link (23), moves the sliding system of the seat cushions (21).

Beside the conversion from sofa to bed, and vice versa, the mechanism has been also designed to follow a particular trajectory. Following this trajectory the mechanism reaches a height above the ground that makes itself manageable, as one can see in FIG. 4. The strong point of this new mechanism is (FIG. 1) is the fact that the link (1) is hinged in the joint (2') between the headboard frame (2) and the central frame (3). From a functional point of view, it solves the problem of accidental closing of the bed. In fact, in known mechanisms, the link (1) is hinged on the headboard frame (2); consequently, accidental closing may occur when the user is seated close to the hinged joint (2') between the headboard frame (2) and the adjacent frame (3). Another strong point of this mechanism is the movement of

the seat cushions (21) by means of only two additional elements. The addition of elements (4) and (5) creates an easy system based on an articulated linkage (17). An additional feature of the mechanism is that the link (6) can have five holes (as in the embodiment of FIG. 1), or four holes and be bolted directly to the fixed structure (7). In the case of a 5-hole link, the link (6) being hinged to the links (8) and (9) performs a roto-translation. In the four holes configuration, the link (6), instead of rototranslating, can rotate around a point fixed with respect to the fixed structure (7). This means the elimation of the links (8) and (9).